

Site Specific Flood Risk Assessment

Client: Hayes Higgins Partnership

Location: St. John's Convent, New Street, Rathangan, Co. Kildare

Date: 09th June 2023

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1. Introduction

IE Consulting was requested by Hayes Higgins Partnership to undertake a Site-Specific Flood Risk Assessment (SSFRA) in support of a planning application for a proposed development at St. John's Convent, New Street, Rathangan, Co, Kildare. The development as proposed comprises the construction of two residential blocks, each containing 12 No. dwelling units, 1 No. community room and all associated site infrastructure works.

The purpose of this SSFRA is to assess the potential flood risk to the site of the proposed development and to assess the impact that the development as proposed may or may not have on the hydrological regime of the area.

Quoted ground levels or estimated flood levels relate to Ordnance Datum (Malin) unless stated otherwise.

This flood risk assessment study has been undertaken in consideration of the following guidance document:

'The Planning System and Flood Risk Management – Guidelines for Planning Authorities' DOEHLG 2009.

2. Proposed Site Description

2.1. General

The proposed development site is located at St. John's Convent, New Street, Rathangan, Co. Kildare. The site is bounded to the east and west by existing properties, to the south by the R414 (New Street) and to the north by agricultural lands. The total area of the proposed development site is approximately 0.67 hectares.

The location of the proposed development site is illustrated on *Figure 1* below and is shown on *Drawing Number IE2728-001-A, Appendix A*.

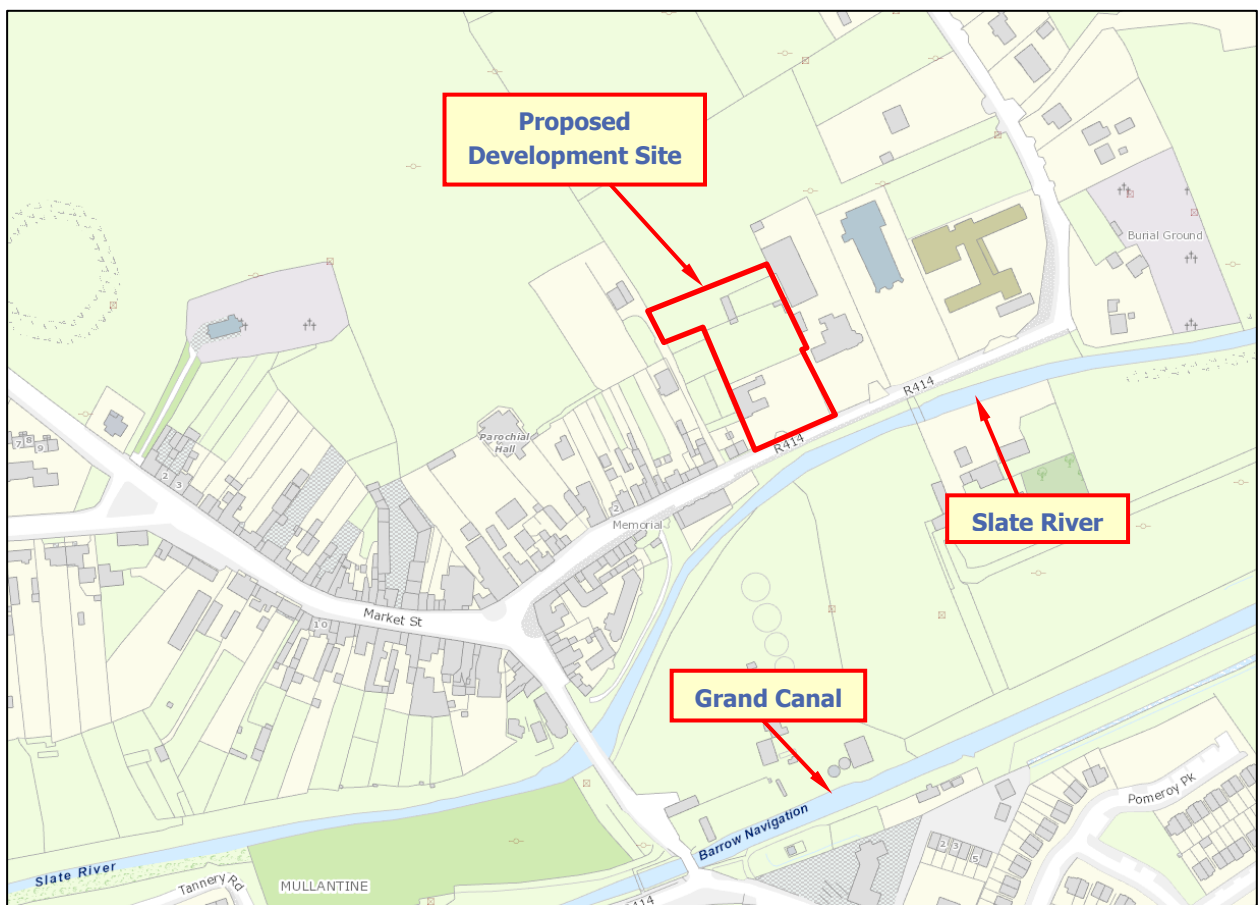


Figure 1 – Site Location

2.2. Existing Topography Levels at Site

The proposed development site slopes moderately from the northern boundary of the site to the southern boundary at an approximate gradient of 2.32%.

Existing ground elevations range from approximately 70.05m OD (Malin) at the southern boundary of the site to 73.36 OD (Malin) adjacent to the northern boundary of the site.

2.3. Local Hydrology, Landuse & Existing Drainage

The most immediate and significant hydrological feature in the vicinity of the proposed development site is the Slate River which flows in an east to west direction approximately 23m beyond the southern boundary of the site. The Grand Canal is also located approximately 232m beyond the southern south east of the southern boundary of the site.

The catchment area of the River Slate was delineated and found to be approximately 172.088km² to a point downstream of the site. An assessment of the Slate River upstream catchment area indicates that the catchment is predominantly rural in nature with the urban fraction accounting for approximately 0.0325 % of the total catchment area.

3. Initial Flood Risk Assessment

The flood risk assessment for the proposed development site is undertaken in three principal stages, these being 'Step 1 – Screening', 'Step 2 – Scoping' and 'Step 3 – Assessing'.

3.1. Possible Flooding Mechanisms

Table 1 below summarises the possible flooding mechanisms in consideration of the site:

Source/Pathway	Significant?	Comment/Reason
Tidal/Coastal	No	The site is not located within a coastal or tidally influenced region.
Fluvial	Yes	The Slate River is located approximately 23m beyond the southern boundary of the site. The Grand Canal is located approximately 232m beyond the southern boundary of the site.
Pluvial (urban drainage)	No	There is no major or significant drainage or water supply infrastructure located in the vicinity of the site.
Pluvial (overland flow)	No	The site is not surrounded by significantly elevated lands and does not provide an important surface water discharge point to adjacent lands.
Blockage	No	There are no significant or restrictive hydraulic structures in the vicinity of the site.
Groundwater	No	There are no significant springs or groundwater discharges mapped or recorded in the immediate vicinity of the site

Table 1: Flooding Mechanisms

The primary potential flood risk to the proposed development site can be attributed to an extreme fluvial flood event in the Slate River and/or the Grand Canal located beyond the southern boundary of the site.

In accordance with 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities - DOEHLG 2009' the potential flood risk to the site of the proposed development is analysed in the subsequent 'Screening Assessment' and 'Scoping Assessment' section of this study report.

4. Screening Assessment

The purpose of the screening assessment is to establish the level of flooding risk that may or may not exist for a particular site and to collate and assess existing current or historical information and data which may indicate the level or extent of any flood risk.

If there is a potential flood risk issue then the flood risk assessment procedure should move to 'Step 2 – Scoping Assessment' or if no potential flood risk is identified from the screening stage then the overall flood risk assessment can end at 'Step 1'.

The following information and data were collated as part of the flood risk screening assessment for the proposed development site.

4.1. OPW/EPA/Local Authority Hydrometric Data

Existing sources of OPW, EPA and local authority hydrometric data were investigated. As illustrated in *Figure 3* below, this assessment has determined there is one hydrometric gauging station located in the general vicinity of the proposed development site.

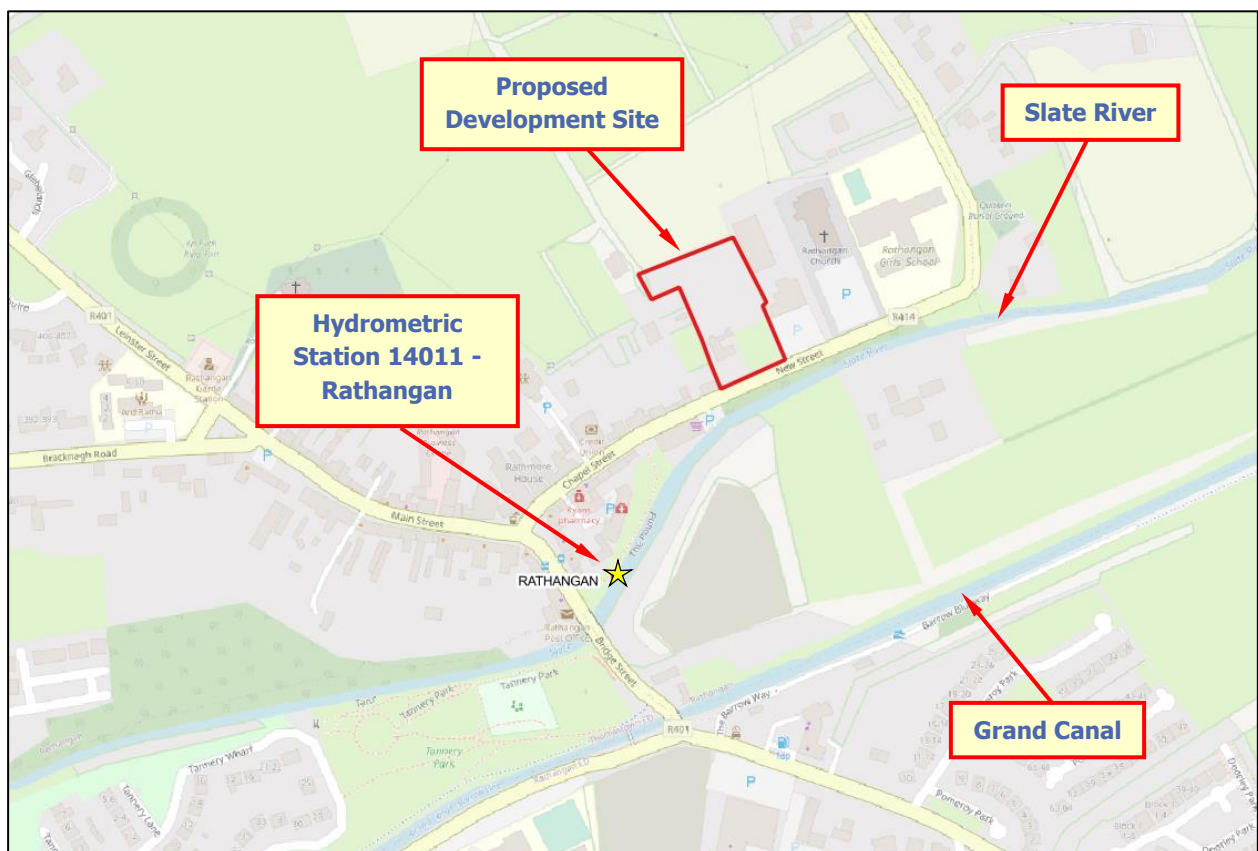


Figure 2 - Hydrometric Gauging Station

Hydrometric station 14011 is located on the Slate River approximately 185m downstream of the proposed development site.

The hydrometric data from gauging station 14011 was examined to assess the suitability of the data to assist in the prediction of extreme flood flows and levels in the vicinity of the proposed development site. Hydrometric data for this station is available from 10-01-1999 to the present day. If required, the data from this gauging station may be suitable for the determination of flood levels in the general vicinity of the proposed development site.

4.2. OPW PFRA Indicative Flood Mapping

Preliminary Flood Risk Assessment (PFRA) Mapping for Ireland was produced by the OPW in 2011. OPW PFRA flood map number 2019/MAP/218/A illustrates indicative flood zones within this area of County Kildare.

Figure 3 below illustrates an extract from the above indicative flood map in the vicinity of the proposed development site.

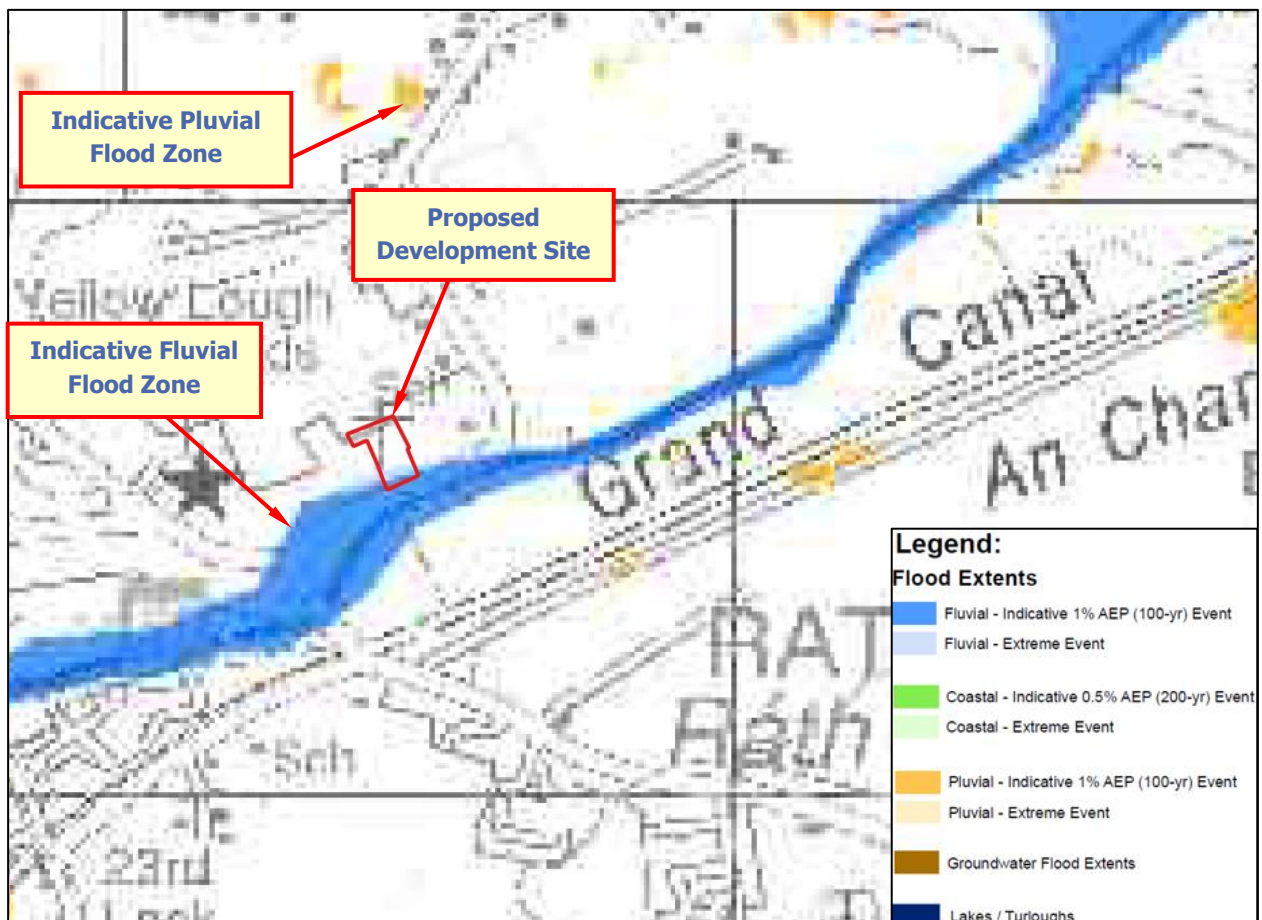


Figure 3 - OPW PFRA Mapping

The OPW PFRA flood mapping indicates that a limited area adjacent to the southern boundary of the proposed development site falls within an indicative fluvial flood zone. The site does not fall within an indicative pluvial or groundwater flood zone.

It should be noted that the extent of flooding illustrated on these maps was developed using a low-resolution digital terrain model (DTM) and illustrated flood extents are intended to be indicative only. The flood extents mapped on the PFRA maps are not intended to be used on a site specific basis.

4.3. OPW Flood Info Past Flood Events

The OPW Flood Info Website (www.floodinfo.ie) was consulted in relation to available historical or anecdotal information on any flooding incidences or occurrences recorded in the vicinity of the proposed development site. *Figure 4* below illustrates mapping from the Flood Info website in the vicinity of the site.

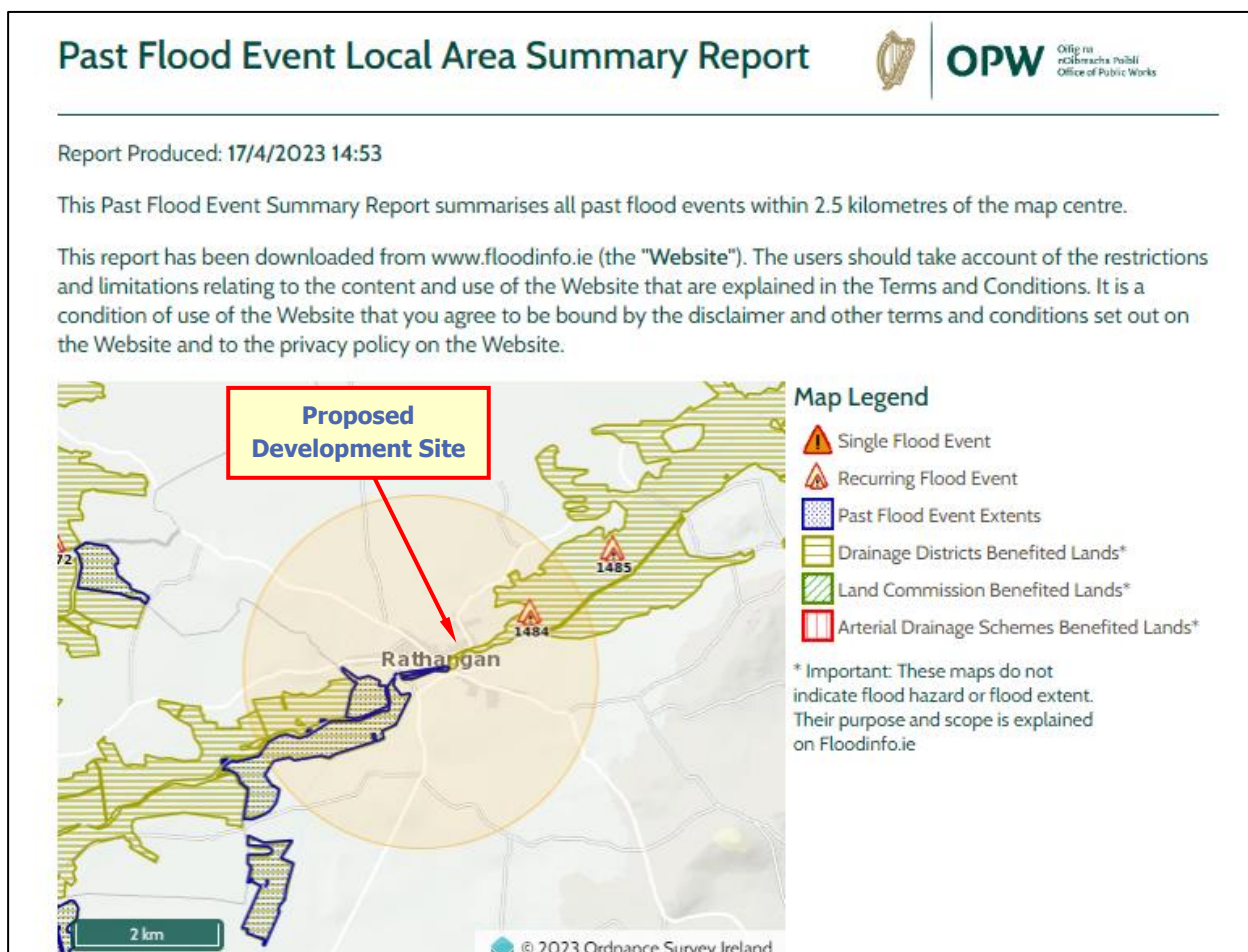


Figure 4 - OPW Flood Info Records

Figure 4 above indicates that there is one recorded recurring flood event located approximately 1.1km upstream of the proposed development site (Flood ID = 1484). The OPW meeting minutes indicate that

this area of Rathangan floods every year. No specific data or photographic record of this specific recurring flood event is available on the OPW Floodinfo.ie portal.

There is no recorded or anecdotal information or data to suggest that the above recurring flood event has impacted the area of the proposed development site.

4.4. Ordnance Survey Historic Mapping

Available historic mapping for the area was consulted, as this can provide evidence of historical flooding incidences or occurrences. The maps that were consulted were the historical 6-inch maps (pre-1900), and the historic 25-inch map series.

Figure 5 and *Figure 6* below show the historic mapping for the area of the proposed development site.

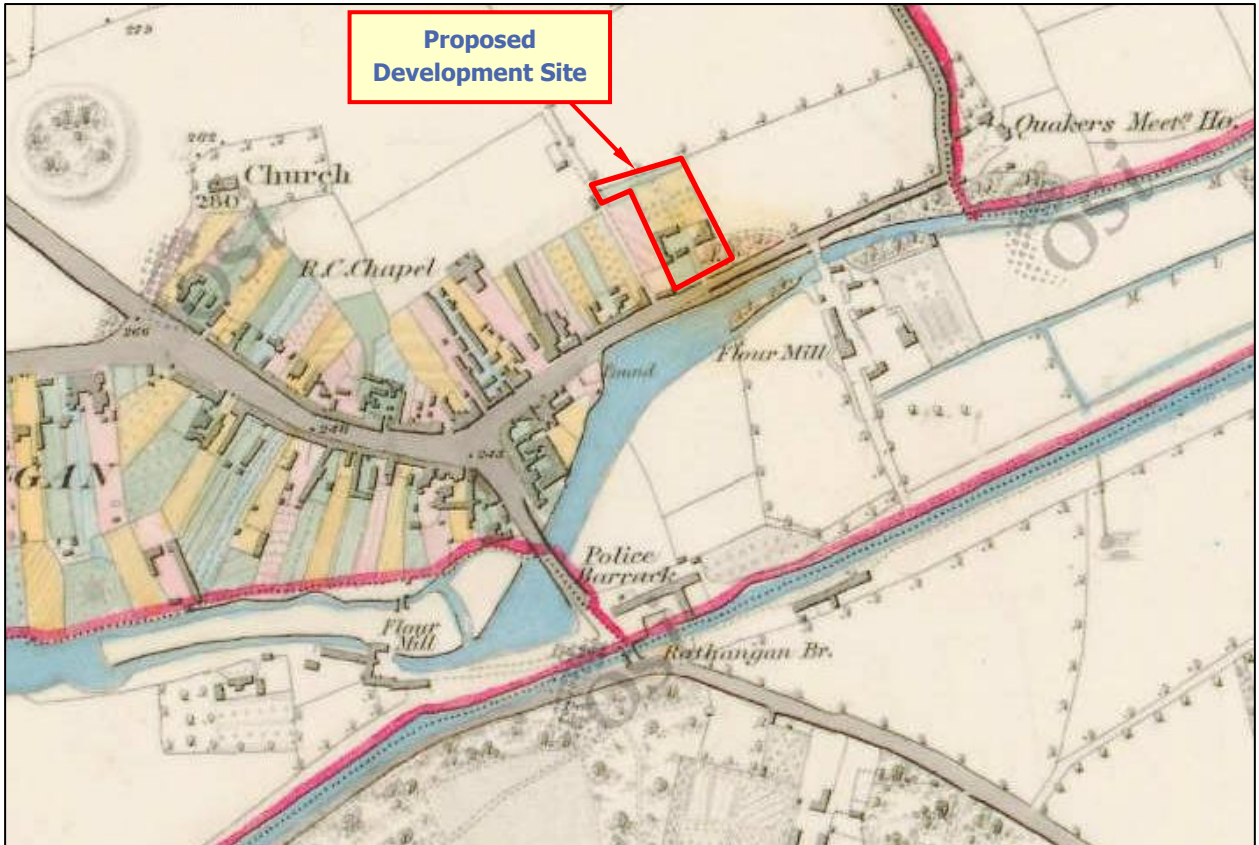


Figure 5 - Historic 6 Inch Mapping

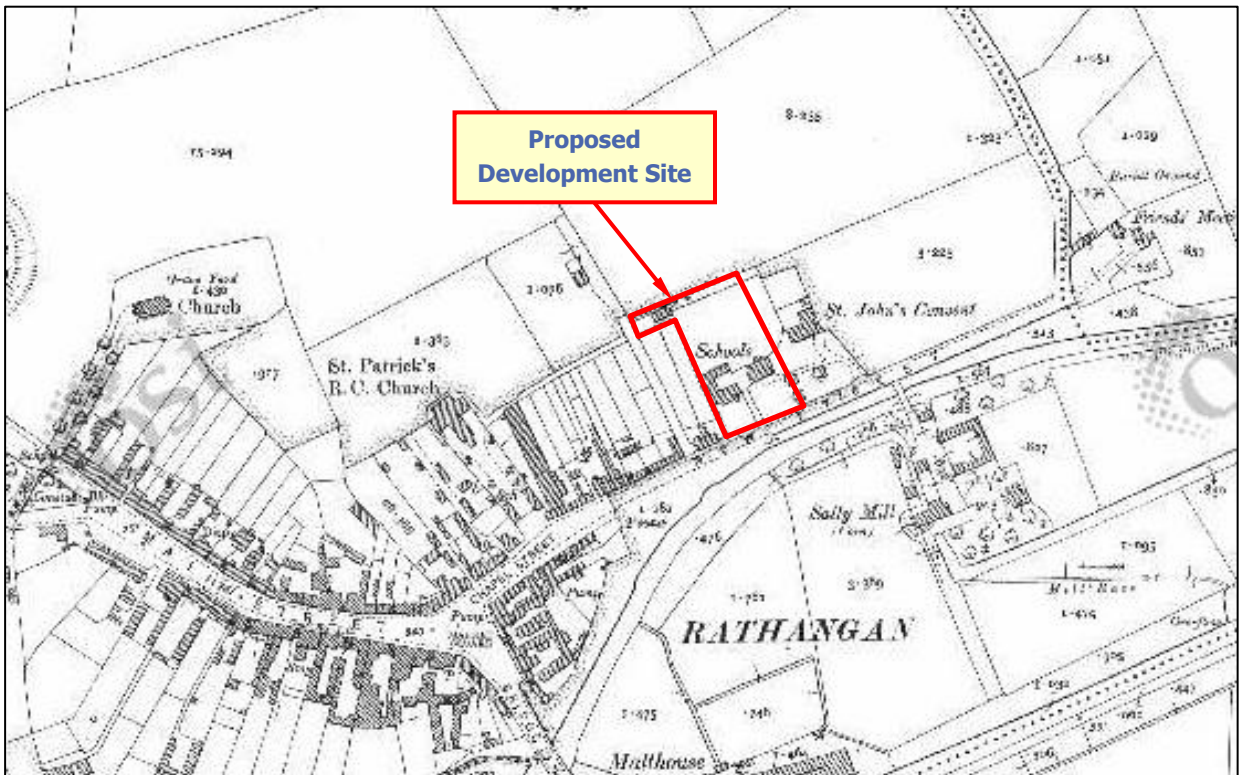


Figure 6 - Historic 25 Inch Mapping

The historic 6 inch and 25 inch mapping does not indicate any historical or anecdotal instances of flooding within or adjacent to the boundary of the proposed development site.

4.5. Geological Survey of Ireland Mapping

The alluvial deposit maps of the Geological Survey of Ireland (GSI) were consulted to assess the extent of any alluvial deposits in the vicinity of the proposed development site. Alluvial deposits can be an indicator of areas that have been subject to flooding in the recent geological past.

Figure 7 below illustrates the sub-soils mapping for the general area of the site.

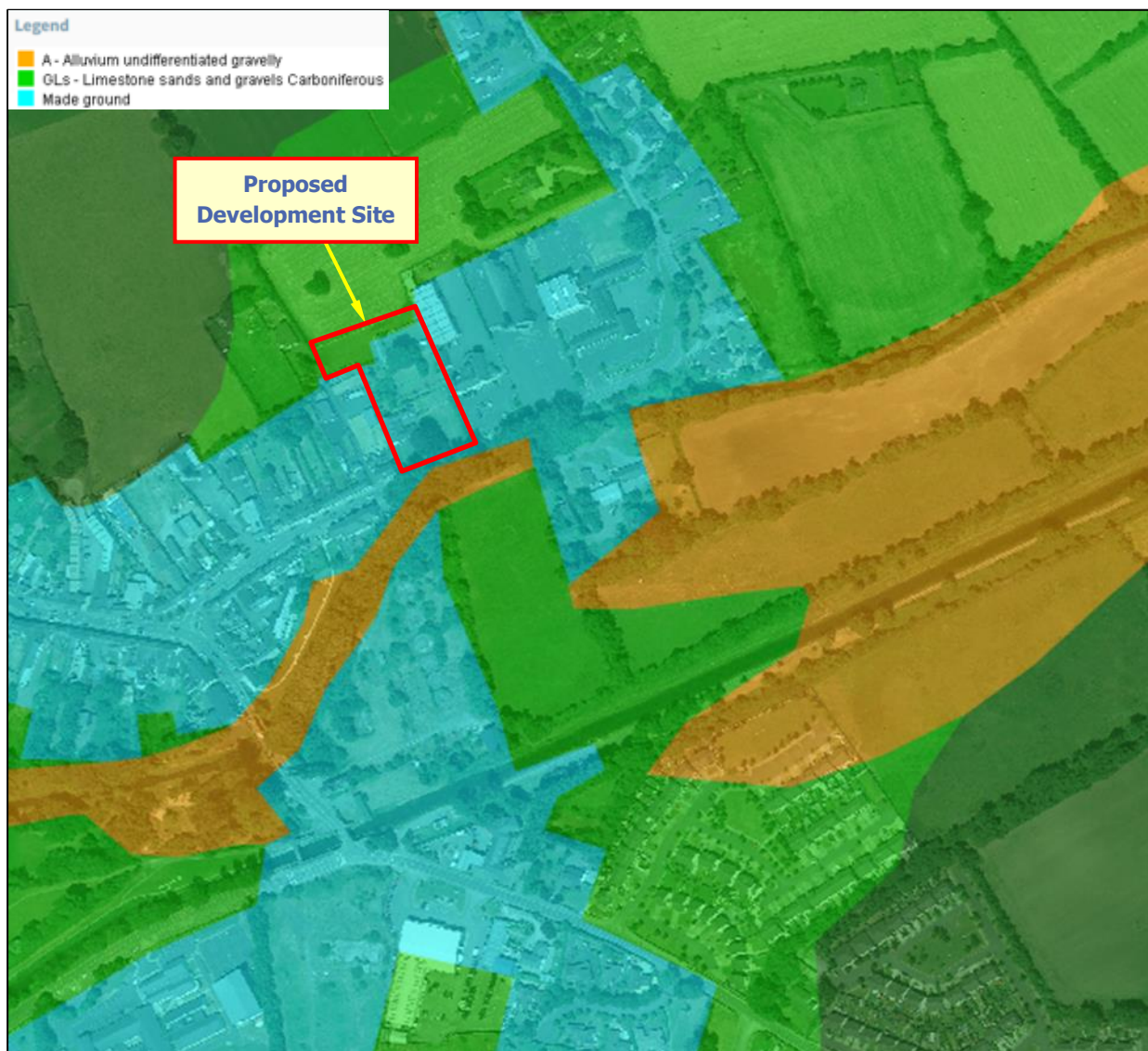


Figure 7 - GSI Subsoil Mapping

Figure 7 above indicates that the site is primarily underlain by Made Ground with the remainder underlain by Carboniferous Limestone sands and gravels in the north of the site. Alluvium deposits are mapped close to the southern boundary of the site, however these do not encroach the site boundary.

4.6. Geological Survey of Ireland Groundwater Flood Mapping

Historic and Predictive Groundwater Mapping for Ireland was prepared by the GSI Department of Communication, Climate Action, and Environment in collaboration with Trinity College Dublin and the Institute of Technology Carlow.

Figure 8 below illustrates an extract from the above groundwater flood mapping in the vicinity of the site.

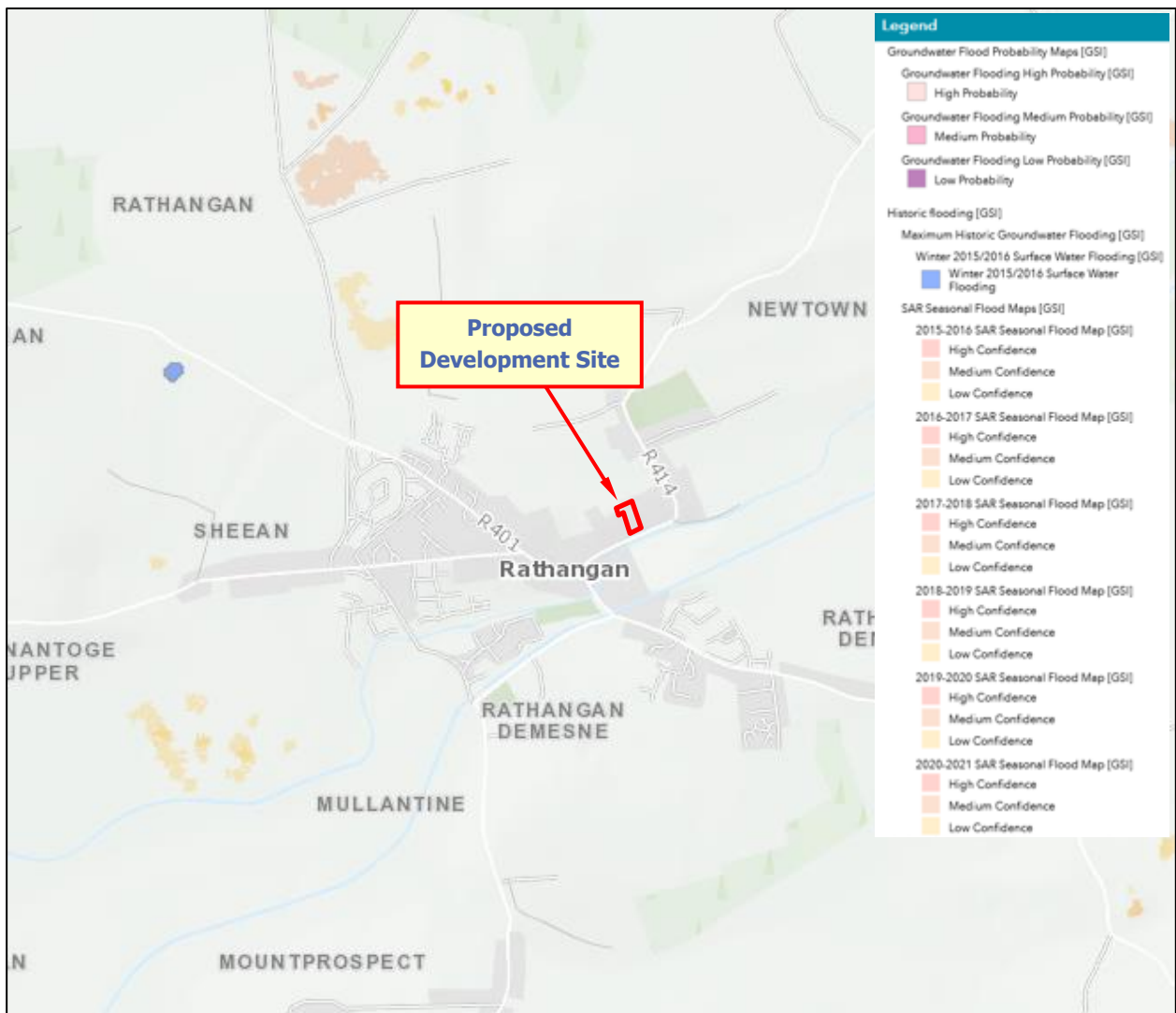


Figure 8 - GSI Groundwater Flood Mapping

The above GSI Groundwater Mapping indicates no areas of predictive or historical groundwater or surface water flooding located at or in the vicinity of the site.

4.7. South Eastern CFRAM Study

The South Eastern Catchment Flood Risk & Management Study (CFRAMS) has been undertaken by the OPW and the final version of the flood maps were issued in January 2017. Flood risk extent and depth maps for further assessment areas within Rathangan have also been produced.

OPW CFRAMS predictive fluvial flood map number O14RTN_EXFCD_F0_03 illustrates predictive extreme present day scenario fluvial flood extent zones associated with the Slate River in the vicinity of the proposed development site.

Figure 9 below (extracted from CFRAMS flood maps O14RTN_EXFCD_F0_03) illustrates the predictive extreme present day scenario 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) flood extents in the vicinity of the site.

A full copy of OPW CFRAMS flood extent map O14RTN_EXFCD_F0_03 is presented in *Appendix B*.

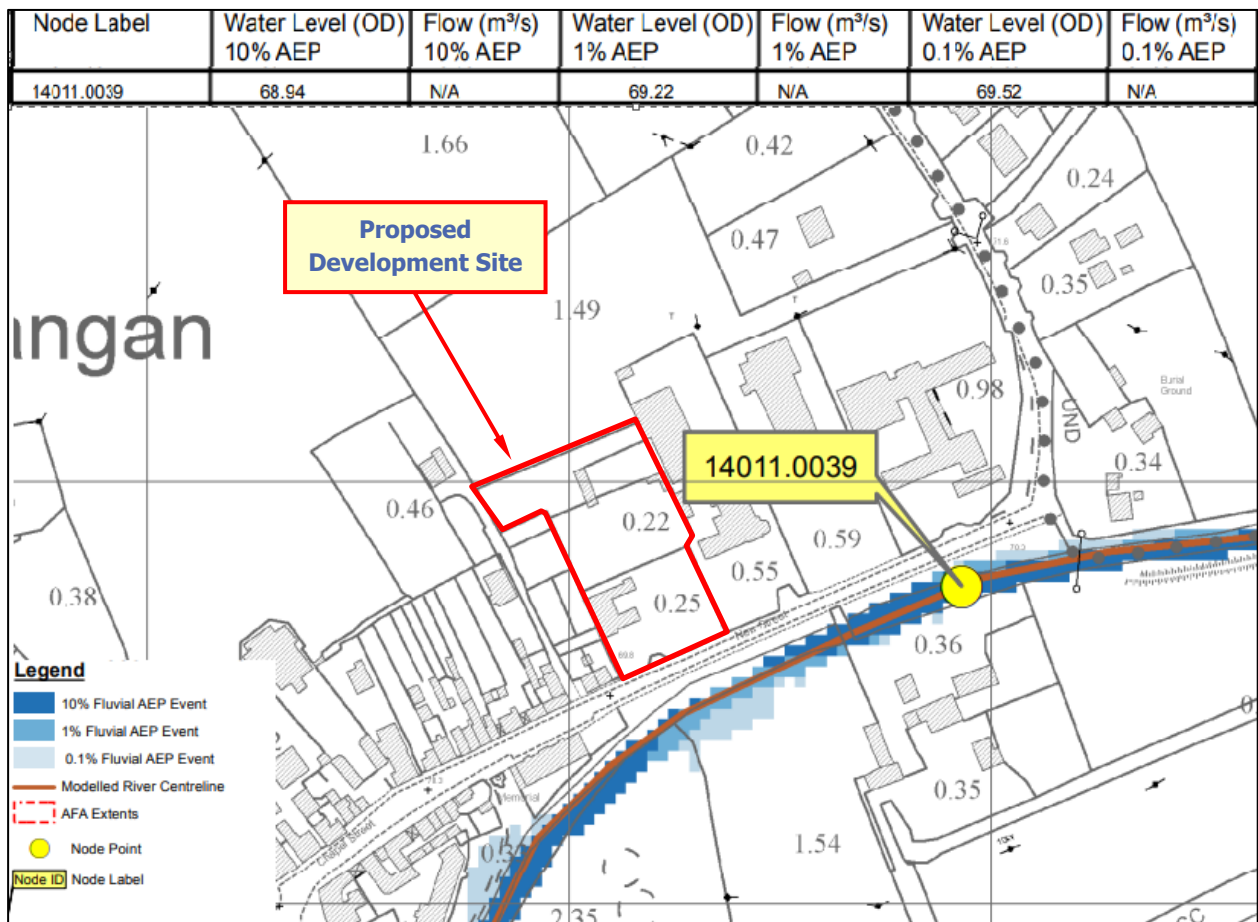


Figure 9 – CFRAMS Fluvial Flood Maps

As illustrated in *Figure 9* above, the site of the proposed development does not fall within a predictive present day scenario 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) fluvial flood zone.

The South Eastern CFRAMS flood map reference O14RTN_EXFCD_F0_03 also provides information on predictive flood water levels for the present day scenario 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) fluvial flood events at various node points (hydrological estimation points) along the Slate River.

As illustrated in *Figure 9* above, the node point closest to the proposed development site is referenced as node point 14011.0039 located approximately 120m upstream from the site. Predictive flood levels at this node point are applicable for the purposes of assessing potential flood risk to the proposed development site.

Details of the predictive fluvial flood levels for CFRAMS node point 14011.009 are listed in *Table 2* below.

Node Label	Flood Level (m OD) 10% AEP	Flood Level (m OD) 1% AEP	Flood Level (m OD) 0.1% AEP
14011.0039	68.94	69.22	69.52

Table 2: CFRAMS Predicted Fluvial Flood Volumes & Levels

Existing site ground levels adjacent to the southern boundary of the site range from 70.05m OD – 70.72m OD. These levels are elevated above the predictive 0.1% AEP (1 in 1000 year) flood level listed above.

4.8. Climate Change Scenario

The OPW Floodinfo.ie and OPW WMS resource was utilised to acquire information and data in relation to the climate change scenario predictive fluvial flood extent and flood levels associated with the Slate River in the vicinity of the proposed development site.

Figure 10 below illustrates the predictive mid-range future climate change scenario 1% AEP + CC (1 in 100 year + climate change) and 0.1% AEP + CC (1 in 1000 year + climate change) OPW CFRAMS fluvial flood extents at the location of the proposed development site.

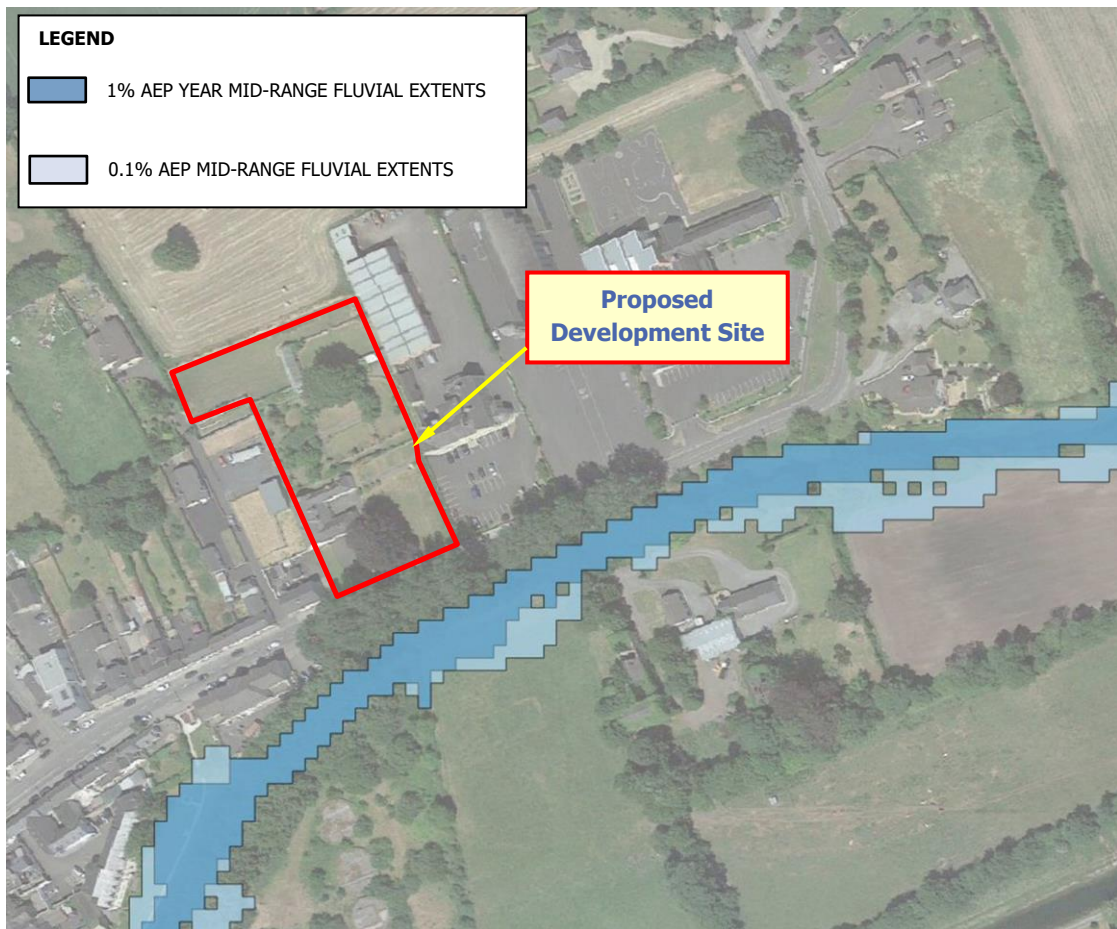


Figure 10 – OPW CFRAMS Flood Extents – Mid-Range Future Climate Change Scenario

As illustrated in *Figure 10* above the proposed development site does not fall within a predictive mid-range future climate change scenario 1% AEP + CC (1 in 100 year + climate change) or a 0.1% AEP + CC (1 in 1000 year + climate change) fluvial flood zone.

Figure 11 below illustrates the predictive high-end future climate change scenario 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) OPW CFRAMS fluvial flood extents at the location of the proposed development site.



Figure 11 – OPW CFRAMS Flood Extents – High-End Future Climate Change Scenario

As illustrated in *Figure 11* above the proposed development site does not fall within a predictive high-end future climate change scenario 1% AEP + CC (1 in 100 year + climate change). The predictive high-end future climate change scenario 0.1% AEP + CC (1 in 1000 year + climate change) flood extent slightly encroaches the southern boundary of the site, however no residential development is proposed as this particular location, this area of the site shall be public open space only.

4.1. Grand Canal – Preliminary Flood Risk Analysis

In July 2011 a Preliminary Flood Risk Analysis Report was undertaken by Waterways Ireland to assess the possible flood risk to adjacent lands and properties associated with the Royal Canal, the Grand Canal, Lough Allen Canal, the Jamestown Canal and the River Blackwater / Errina-Plassey Canal.

In relation to the assessment of the Grand Canal Barrow Navigation reach, the analysis determined that no historic instances of flooding have been recorded at Rathangan, and that due to the on-going management, inspection and assessment of this watercourse, the risk of flooding from the Grand Canal to adjacent lands and properties in Rathangan is deemed to be extremely LOW.

5. Scoping Assessment

The purpose of the scoping stage is to identify possible flood risks and to implement the necessary level of detail and assessment to assess these possible risks, and to ensure these can be adequately addressed in the flood risk assessment. The scoping exercise should also identify that sufficient quantitative information is already available to complete a flood risk assessment appropriate to the scale and nature of the development proposed.

The above screening assessment indicates that the primary flood risk to the proposed development site can be attributed to an extreme fluvial flood event in the Slate River located beyond the southern boundary of the proposed development site.

In consideration of the information collated as part of the screening exercise, and the availability of other information and data specific to the area of the proposed development site, it is considered that sufficient quantitative information to complete an appropriate flood risk assessment for the proposed development site can be derived from the information collated as part of the screening exercise.

In particular, the present day and climate change scenario flood extent maps and predictive flood levels for the area produced as part of the OPW South Eastern CFRAM study are based on the results of detailed hydraulic modelling undertaken along the Slate River and provide a reasonably accurate delineation of flood zones and prediction of extreme flood levels at and in the general vicinity of the proposed development site.

The specific flood risk to and from the proposed development site is assessed in the subsequent 'Assessing Flood Risk' stage of this study report.

6. Assessing Flood Risk

Flood risk from a particular watercourse is normally assessed for a 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) flood event, in accordance with most county development plans and in accordance with the DOEHLG guidelines '*The Planning System and Flood Risk Management Guidelines*'.

The following section present an analysis and assessment of the estimated 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) flood event in the Slate River.

6.1. Assessment of Extreme Flood Extents & Flood Levels

As illustrated in *Figure 9* above the proposed development site does not fall within a predictive present day scenario 1% AEP (1 in 100 year) or a 0.1% AEP (1 in 1000 year) fluvial flood zone associated with the Slate River.

The predictive present day scenario 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) flood levels in the Slate River at the general location of the proposed development site are 69.22m OD and 69.52m OD respectively. Reference to the architects proposed site layout drawing indicates that the proposed development 'Block A' and 'Block B' shall be constructed to finished ground floor levels of 71.748 m OD and 73.491m OD respectively. These proposed finished floor levels are significantly elevated above the predictive 0.1% AEP flood level in the Slate River.

As illustrated in *Figure 10* above the proposed development site does not fall within a predictive mid-range future climate change scenario 1% AEP + CC (1 in 100 year + climate change) or a 0.1% AEP + CC (1 in 1000 year + climate change) fluvial flood zone associated with the Slate River.

As illustrated in *Figure 11* above the proposed development site does not fall within a predictive high-end range future climate change scenario 1% AEP + CC (1 in 100 year + climate change) fluvial flood zone associated with the Slate River. The predictive high-end future climate change scenario 0.1% AEP + CC (1 in 1000 year + climate change) flood zone slightly encroaches the southern boundary of the site, however no residential development is proposed as this particular location, this area of the site shall be public open space only.

In summary, the proposed development site, and areas of the site where development is proposed, is not predicted to be impacted due to the occurrence of an extreme present day scenario, mid-range future climate change scenario or high-end climate change scenario fluvial flood event.

6.2. Potential Hydrological Impact of Development as Proposed

As presented above, the proposed development site, and areas of the site where development is proposed, do not fall within a predictive present day scenario, mid-range future climate change scenario or high-end future climate change scenario fluvial flood zone. The development as proposed shall therefore not result in an adverse impact to the existing hydrological regime of the area or increase fluvial flood risk elsewhere.

In consideration of potential pluvial flood risk from the development as proposed, the screening assessment undertaken as part of this Site Specific Flood Risk Assessment indicates that the proposed development site does not fall within an indicative, predictive or anecdotal pluvial flood zone. The development as proposed shall incorporate an appropriate stormwater management system designed in accordance with the requirements and standards of the relevant Kildare County Council Drainage Policy (see details from Hayes Higgins Partnership).

In summary, and in consideration of the incorporation of an appropriate stormwater management system, the development as proposed is therefore not expected to result in an adverse impact to the existing pluvial regime of the area or increase pluvial flood risk elsewhere.

7. Development in the Context of the Guidelines

In the context of the 'Planning System and Flood Risk Management Guidelines, DOEHLG, 2009' three flood zones are designated in consideration of flood risk to a particular development site.

Flood Zone 'A' – where the probability of flooding from rivers and watercourses is the highest (greater than 1% or 1 in 100 year for river and watercourse flooding and 0.5% or 1 on 200 for coastal or tidal flooding).

Flood Zone 'B' – where the probability of flooding from rivers and watercourses is moderate (between 0.1% or 1 in 1000 year for river and watercourse flooding and 0.5% or 1 on 200 for coastal or tidal flooding).

Flood Zone 'C' – where the probability of flooding from rivers and watercourses is low or negligible (less than 0.1% of 1 in 1000 year for both river and watercourse and coastal flooding). Flood Zone 'C' covers all areas that are not in Zones 'A' or 'B'.

The 'Planning System and Flood Risk Management Guidelines' list the planning implications for each flood zone, as summarised below:

Zone A – High Probability of Flooding. Most types of development would not be considered in this zone. Development in this zone should only be considered in exceptional circumstances, such as in city and town centres, or in the case of essential infrastructure that cannot be located elsewhere, and where the 'Planning System and Flood Risk Management Guidelines' justification test has been applied. Only water-compatible development, such as docks and marinas, dockside activities that require a waterside location, amenity open space and outdoor sports and reaction would be considered appropriate in this zone.

Zone B – Moderate Probability of Flooding. Highly vulnerable development such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses, strategic transport and essential utilities infrastructure would generally be considered inappropriate in this zone, unless the requirements of the justification test can be met. Less vulnerable development such as retail, commercial and industrial uses and recreational facilities might be considered appropriate in this zone. In general however, less vulnerable development should only be considered in this zone if adequate lands or sites are not available in Zone 'C' and subject to a flood risk assessment to the appropriate level of detail to demonstrate that flood risk to the development can be adequately managed and that development in this zone will not adversely affect adjacent lands and properties.

Zone C – Low to Negligible Probability of Flooding. Development in this zone is appropriate from a flood risk perspective. Developments in this zone are generally not considered at risk of fluvial flooding and would not adversely affect adjacent lands and properties from a flood risk perspective.

In the context of the 'Planning System and Flood Risk Management Guidelines, DOEHLG, 2009' the assessment and analysis undertaken a part of this Site Specific Flood Risk Assessment indicates that the proposed development site, and areas of the site where development is proposed, does not fall within a predictive present day scenario, mid-range future climate change scenario or high-end climate change scenario Flood Zone 'A' or Flood Zone 'B'.

The area of the site where development is proposed therefore falls within Flood Zone 'C'.

The development as proposed is therefore not subject to the requirements of 'The Justification Test'.

8. Summary Conclusions

In consideration of the findings of this Site Specific Flood Risk Assessment and analysis the following conclusions are made in respect of the proposed development site:

- *A Site Specific Flood Risk (SSFRA) assessment, appropriate to the type and scale of development proposed, and in accordance with 'The Planning System and Flood Risk Management Guidelines – DoEHLG-2009' has been undertaken.*
- *The proposed development site has been screened, scoped and assessed for flood risk in accordance with the above guidelines.*
- *The primary flood risk to the proposed development site can be attributed to an extreme fluvial flood event in the Slate River located beyond the southern boundary of the site.*
- *The site is not at risk of pluvial or groundwater flooding.*
- *In the context of the 'Planning System and Flood Risk Management Guidelines, DOEHLG, 2009' the assessment and analysis undertaken a part of this Site Specific Flood Risk Assessment indicates that the proposed development site, and areas of the site where development is proposed, does not fall within a predictive present day scenario, mid-range future climate change scenario or high-end climate change scenario Flood Zone 'A' or Flood Zone 'B'.*
- *The area of the site where development is proposed falls within Flood Zone 'C'.*
- *The development as proposed shall incorporate an appropriate stormwater management system designed in accordance with the requirements and standards of the relevant Kildare County Council Drainage Policy.*
- *In consideration of the findings of this Site Specific Flood Risk Assessment and the incorporation of an appropriate stormwater management system, the development as proposed is not expected to result in an adverse impact to the existing hydrological regime of the area or increase fluvial or pluvial flood risk elsewhere. The development as proposed is therefore considered to be appropriate from a flood risk perspective.*

Appendices

Appendix A. Drawings

IE2728-001-A - Site Location



SITE OF PROPOSED DEVELOPMENT

LEGEND

rev.	date	amendment	RM drn	MOF ckd
A	19.04.23	ISSUE	RM	MOF

PROPOSED DEVELOPMENT AT RATHANGAN, CO. KILDARE

SITE SPECIFIC FLOOD RISK ASSESSMENT

SITE LOCATION

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

CARLOW OFFICE:
INNOVATION CENTRE
GREEN ROAD
CARLOW R95 W248

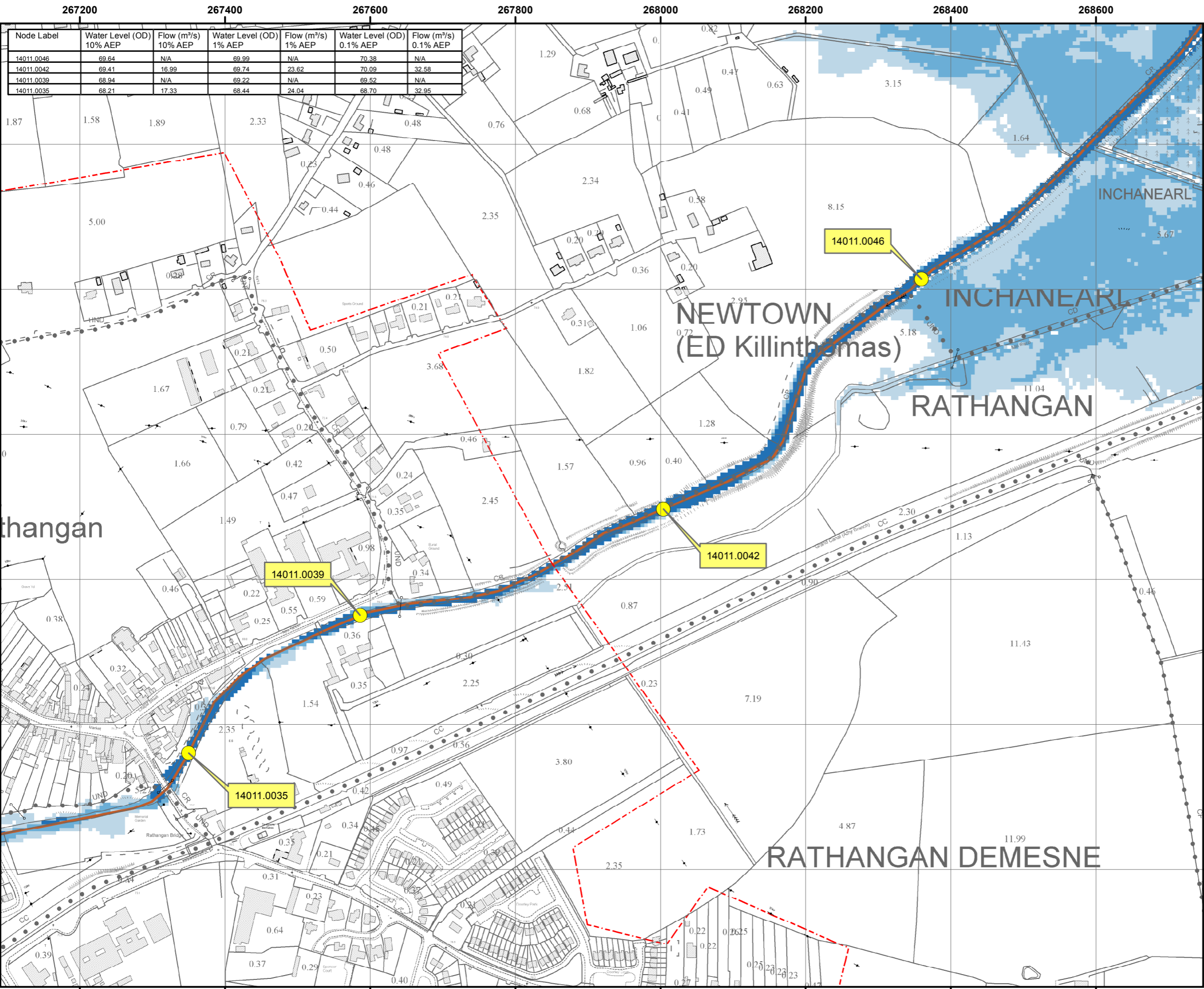
NEWRY OFFICE:
1 RDC HOUSE
WIN BUSINESS PARK
NEWRY BT35 6PH

file location:	N:\IE2728\DRAWINGS	scale:	1:50,000	A3
drawing status:	PLANNING	datum:	MALIN	
drawing no.	IE2728-001	drawn:	RM	
rev:	A	checked:	MOF	
		approved:	PMS	
		date:	19/04/2023	

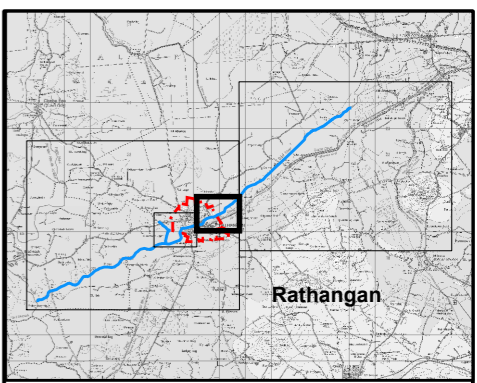
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Appendix B. – CFRAMS Map

O14RTN_EXFCD_F0_03



Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
14011.0046	69.64	N/A	69.99	N/A	70.38	N/A
14011.0042	69.41	16.99	69.74	23.62	70.09	32.58
14011.0039	68.94	N/A	69.22	N/A	69.52	N/A
14011.0035	68.21	17.33	68.44	24.04	68.70	32.95



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

- Legend**
- 10% Fluvial AEP Event
 - 1% Fluvial AEP Event
 - 0.1% Fluvial AEP Event
 - Modelled River Centreline
 - AFA Extents
 - Node Point
 - Node ID Node Label

FINAL

REV:	NOTE:	DATE:
01	Amendments to Flood Extent	28/11/2016



The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

T +44(0) 28 90 667914
F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map: Rathangan Fluvial Flood Extents
Map Type: EXTENT
Source: FLUVIAL
Map Area: HPW
Scenario: CURRENT
Drawn By: F.M.C. Date: 6 January 2017
Checked By: J.M. Date: 6 January 2017
Approved By: G.G. Date: 6 January 2017
Drawing No.: O14RTN_EXFCD_F0_03
Map Series: Page 3 of 4
Drawing Scale: 1:5,000 @ A3

